REMARKS

Applicants respectfully request reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

As a preliminary matter, Applicants note the Office Action's acknowledgment of receipt of papers submitted under 35 U.S.C. § 119(a)-(d) and consideration of the Information Disclosure Statement submitted on August 19, 2003.

Claim 17 stands objected to for being in improper dependent form. Claims 1-3, 5 and 14 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,308,712 to Seike et al. (hereinafter "Seike"). Claims 1-6, 9-11 and 13-16 stand rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over U.S. Patent No. 6,228,521 to Kim et al. (hereinafter "Kim"). Claims 7, 8 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kim and claim 17 stands rejected under the same as being unpatentable over Kim in view of U.S. Patent No. 6,344,426 to Hata et al. (hereinafter "Hata").

By this amendment, claims 5-8 have been canceled without prejudice to or disclaimer of the subject matter contained therein. Claims 1-4, 9-13 and 15-17 have been amended to further define the subject matter Applicants regard as the invention as described in greater detail below. Claim 14 remains unchanged in the application.

This amendment adds, changes and/or deletes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier. After amending the claims as set forth above, claims 1-4 and 9-17 are now pending in this application for consideration.

Applicants respectfully submit that each of the independent claims is patentably distinguishable over the cited references as required by §§ 102 and 103. Applicants further submit that none of the cited references, whether considered alone or in combination, discloses Applicants' claimed unit cell for a solid oxide fuel cell including a substrate , a battery, a high porosity layer and a low porosity layer wherein, ***a porosity of the first low***

porosity layer is lower than that of the high porosity layer and equal to or higher than that of the second low porosity layer, with value ranges of a pore size, a thickness and a surface roughness Ra of the first low porosity layer being the same as those of the second low porosity layer as recited in amended independent claim 1. Amended independent claim 15 recites a similar feature in the context of a method claim. By contrast, the cited references fail to disclose, teach or suggest this claimed feature. Accordingly, independent claims 1 and 15 and claims dependent therefrom are patentably distinguishable over the cited references. This distinction will be further described below.

THE CLAIMS ARE IN PROPER FORM

Claim 17 stands objected to as being of improper dependent form for failing to further limit the subject matter of a previous claim. While Applicants are of the opinion that claim 17 is in proper form, Applicants have amended claim 17 to further limit the subject matter of independent claim 15 by limiting the step of forming the electrolyte layer by a physical vapor deposition method. For this reason, Applicants respectfully submit that claim 17 is in proper form and accordingly, request that the objected be withdrawn.

THE CLAIMS DISTINGUISH OVER THE CITED REFERENCES

Rejections Under 35 U.S.C. § 102

Claims 1-3, 5 and 14 stand rejected under 35 U.S.C. §102(b) as being anticipated by Seike and claims 1-6, 9-11 and 13-16 stand rejected under the same as being anticipated by Kim. In response, Applicants traverse these rejections, and respectfully submit that the above claims are allowable for at least the reasons that follow.

Applicants rely on MPEP § 2131, entitled "Anticipation – Application of 35 U.S.C. 102(a), (b), and (e)," which states that a "claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Section 103 amplifies the meaning of this anticipation standard by pointing out that anticipation requires that the claimed subject matter must be "*identically* disclosed or

described" by the prior art reference. (Emphasis added.) It is respectfully submitted that neither Seike nor Kim describes each and every element of any pending claim.

Claim 1 is directed to a unit cell for a solid oxide fuel cell. The unit cell includes a substrate, a battery element formed on the substrate with the battery element provided with an electrode layer and an electrolyte layer, a high porosity layer and a low porosity layer. The low porosity layer includes a first low porosity layer and a second low porosity layer. According to one exemplary embodiment of the present invention as recited in amended independent claim 1, ***a porosity of the first low porosity layer is lower than that of the high porosity layer and equal to or higher than that of the second low porosity layer, with value ranges of a pore size, a thickness and a surface roughness Ra of the first low porosity layer being the same as those of the second low porosity layer***. Amended independent claim 15 recites a similar feature in the context of a method claim. Support for the amendments to claims 1 and 15 can at least be found on page 10, line 20 through page 14, line 4 and Figs. 2-4 of the present specification. With this feature, the battery element including the electrode layer and the electrolyte layer can be formed directly on the substrate which reduces the overall size of the fuel cell operating at low temperatures. (See, specification, page 3, lines 21-27).

In contrast to the embodiment of the present invention, the teachings of Seike are entirely directed towards an air electrode and a solid electrolyte fuel cell incorporating the air electrode capable of increasing the oxide agent supply amount to three-phase interfaces, where the air electrode, the solid electrolyte film and the oxide agent contact one another and also to increasing the output of the cell (column 2, lines 3-11). As illustrated in Figs. 1 and 3, the electrode 5 includes a first layer 1, a second layer 2, and a solid electrode film 3 formed on the second layer 2. A fuel electrode film 4 is further formed on the surface of the solid electrolyte film 3 (column 3, lines 58-64). The first layer 1 has an open porosity of 25 to 57 %, pore diameters of 2.5 to 12 μm and a resistivity of less than 022 Ωcm and the second layer has an open porosity of 8 to 24 %, and pore diameters of 0.2 to 3 μm with a ratio of the thickness of the second layer 2 to the first layer 1 of 2 to 28% (column 4, lines 15-20).

Accordingly, Seike discloses nothing about the comparisons of the porosity of the first low porosity layer and the high porosity layer and first low porosity layer and the second low porosity layer. Moreover, Seiko discloses nothing about the ***value ranges of a pore size, a thickness and a surface roughness Ra of the first low porosity layer being the same as those of the second low porosity layer***. As stated above, Seike is concerned with increasing the oxide agent supply amount and output of the cell. Thus, Seike discloses nothing in regards to reducing the overall size of the fuel cell which operates at low temperatures.

Kim is directed to a high power density solid oxide fuel cell having a graded anode. As illustrated in Fig. 1, the fuel cell 10 includes a cathode 11 on top of the fuel cell 10 in contact with an electrolyte 12, A graded anode is provided which includes an inner layer 13 and an outer layer 14 (column 5, lines 13-20). Regarding the proximity of the electrolyte/anode interface, the amount of YSZ is large enough and at distances away from the electrolyte/anode interface, the amount of N_iO is increased and that of the YSZ is decreased to have a greater porosity (column 5, lines 17-22). With this arrangement, the fuel cell has superior power densities and more durable and mechanically reliable (column 1, lines 56-60).

Kim discloses nothing about the comparisons of the porosity of the first low porosity layer and the high porosity layer and first low porosity layer and the second low porosity layer. Moreover, Kim discloses nothing about the ***value ranges of a pore size, a thickness and a surface roughness Ra of the first low porosity layer being the same as those of the second low porosity layer***. As stated above, Kim is concerned with fuel cells that exhibit superior power densities and are more durable and mechanically reliable. Thus, Kim discloses nothing in regards to reducing the overall size of the fuel cell which operates at low temperatures.

Accordingly, claim 1 is not anticipated by either Seike or Kim, and therefore the claims that depend from claim 1 are likewise not anticipated. Method claim 15 and its dependencies are also allowable for at least the pertinent reasons detailed above, as claim 15 recites a method of manufacturing a unit cell for a solid oxide fuel cell in substantial concordance with the functionality claimed by the apparatus of claim 1.

Claim Rejections Under 35 U.S.C. §103(a)

In the Office Action, claims 1-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kim and claim 17 stands rejected under the same as being unpatentable over Kim in view of Hata. In response, Applicants respectfully traverse the rejections, relying on MPEP § 2143, which states that:

> [t]o establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

It is respectfully submitted that at least the first and third criteria of MPEP § 2143 have not been met in the Office Action.

The Cited References Do Not Suggest All Claim Recitations

Even if the first requirement of MPEP § 2143 was satisfied in the Office Action (which it is not, as explained below), the cited references still do not meet the third requirement, which is that "the prior art reference (or references when combined) must teach or suggest all the claim limitations."

As discussed in detail above, Kim fails to disclose each of the claimed features recited in independent claims 1 and 15. Hata fails to rectify the deficiencies of Kim. Hata only relates to a porous ceramic sheet applicable to the solid oxide fuel cell to support the thin film of the anode or the electrolyte. Hata, however, fails to disclose or suggest ***a porosity of the first low porosity layer is lower than that of the high porosity layer and equal to or higher than that of the second low porosity layer, with value ranges of a pore size, a thickness and a surface roughness Ra of the first low porosity layer being the same as those of the second low porosity layer*** as recited in each of the independent claims.

In sum, claim 1 and claims dependent thereform are allowable because the combination of Kim and Hata do not teach each and every element of claim 1. Independent

method claim 15 and claims dependent therefrom are patentable over Kim and Hata for at least the same reasons as claim 1.

Even if the first requirement of MPEP § 2143 is satisfied, the third requirement of MPEP § 2143 is not satisfied in the Office Action, since the cited references do not teach each and every element of the present invention. Thus, the present claims are allowable.

Lack of Suggestion or Motivation to Modify or Combine the References

MPEP § 2143.01 states that "the prior art *must* suggest the desirability of the invention." (MPEP § 2143.01, subsection 1, emphasis added.) The Office Action relies solely on the Applicants' disclosure for motivation to modify the Kim reference to arrive at the invention of the independent claims (claims 1 and 15). The Office Action cites nothing in the prior art that provides motivation to modify the reference to arrive at the invention of the independent claims. Instead, the Office Action makes broad assertions regarding the characteristics of the layer stating that "it would have been within the skill of the artisan to determine an optimal pore size given the overall size of the layer." (Office Action, page 4). A mere allegation of an optimal size, without reasoned analysis, is not sufficient to establish motivation sufficient to support a *prmia facie* case of obviousness. If such was not the case, the first requirement of MPEP § 2143 would be vitiated, because such arguments could almost always be made.

The Office Action does not identify where the prior art suggests the desirability of the claimed invention. As noted above, MPEP § 2143.01 states that the "prior art *must* suggest the desirability of the claimed invention." It further states that obviousness

> can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. 'The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.'

(Citations omitted.) There is no *explicit* "teaching, suggestion, or motivation" to modify Kim to achieve the invention of the independent claims. There is also no *implicit* "teaching, suggestion, or motivation" to do so, either. In addition to the above "test" for an "implicit showing," MPEP § 2144.01 provides examples of "implicit disclosures." It is respectfully submitted that the motivation proffered in the Office Action does not rise to a level to be analogous to those examples. A *prima facie* case of obvious has not been established.

In sum, even if the first requirement of MPEP § 2143 could be satisfied, the third requirement of MPEP § 2143 cannot be satisfied with Kim, since the cited reference, even after being modified, does not teach each or suggest each and every element of the claimed invention. Thus, the present claims are allowable.

In view of the fact that the Seike, Kim and Hata patents do not disclose each of the claimed features indicated above, whether considered alone or in any combination, these references cannot be said to anticipate nor can they be said to render obvious the invention which is the subject matter of independent claims 1 and 15. Thus, independent claims 1 and 15 are allowable. Since independent claims 1 and 15 are allowable, claims 2-4, 9-14, 16 and 17 are also allowable by virtue of their direct or indirect dependence from allowable independent claims 1 and 15 and for containing other patentable features. Further remarks regarding the asserted relationship between any of the claims and the cited references is not necessary in view of their allowability. Applicants' silence as to the Office Action's comments is not indicative of being in acquiescence to the stated grounds of rejection.

Applicants believe that the present application is now in condition for allowance. Favorable reconsideration of the application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a check or credit card payment form being in the wrong amount, unsigned, post-dated,

otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicants hereby petition for such extension under 37 C.F.R. §1.136 and authorize payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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